

Under the Hood, Dec., 2018

On a recent car review the automotive writer explained that on a long trip he had calculated the vehicle got 18.9 mpg while the vehicle's computer optimistically reported a 20.6 mpg. The fact that the vehicle computer calculated a result that favored the manufacturer by 9% is only slightly surprising. I suspect that the writer simply divided the total miles traveled (as reported by the trip odometer) by the actual gallons of gas purchased. What the writer didn't report is that odometers are almost always slightly optimistic, so the real error was probably more than 9%. Don't believe me? It is easy to check your trip odometer (or overall odometer) on the freeway. Many of our roads still have odometer check stations where the roadside sign will count from 0 to 5 miles. I would anticipate that most cars will record at least 5.1 miles by the time you reach the 5 mile sign. This might not sound like much, however with this error your odometer is off by 2,000 miles at 100K miles. I don't think the freeway signs are wrong, it is the odometer that is slightly off. Try this on a longer route. Our freeways generally have milepost signs that might read MP210, simply meaning mile post 210. You can check your odometer by recording your reading at MP210 and then again at say MP310. Did your odometer read exactly 100 miles? Your speedometer is operated by the identical speed reading device (typically) in your transmission as your odometer, so expect that your speedometer is off by at least the same ratio as your odometer. Even today, most police pursuit vehicles will have a specially calibrated speedometer, so that when the police pace another vehicle, they can safely report (to the court) an actual speed; well at least as accurate as what the officer can try to pace. Try this on your next roadside radar speed warning sign. I would anticipate that when the sign reports the vehicle is doing 45 mph, the heads-up display in your Corvette is showing 46 or 47 mph. There is clearly an advantage for the manufacturer to have an odometer, speedometer, or computer that reports favorable results. Have you ever noticed that your gas gauge is very slow to come off the full mark, then comes down fairly quickly in the middle of the gauge, and then slows down again as the fuel reaches the empty mark? This is intentional, and almost all vehicles will do this. If it takes a long time for the gauge needle to move off the full mark, it makes the owner feel that they are getting "great gas mileage". Many vehicle gauges (examples might be temperature or oil pressure) will not show any numbers but just a "range" that is considered acceptable. The manufacturers do this to help keep the customer happy and reduce dealer complaints. If the oil pressure gauge in your new Corvette shows 40 psi, but your friend's Corvette gauge reads 46 psi, would you rush down to the local Chevy dealer to ask why your engine was defective? Both engines are probably fine, as there is a manufacturing difference between engines. Yes, I know our new Corvettes provide a "real" number, but many vehicles do not. The only way to really prove that your Corvette is showing "real oil pressure" would be to temporarily install a separate oil pressure gauge. I remember one Mustang owner who destroyed an engine, and later found that the oil pressure sending unit in the Mustang was basically an on-off switch. At about 5 psi, the gauge would jump to the "normal range" and stay in the normal range as long as the real pressure was 5 psi or above. In all my experience I can only recall driving one vehicle where the speedometer wasn't optimistic. This was the family Dodge Dart in which the speedometer read about 15% less than actual. We always suspected that the wrong speedometer drive gear had been installed at the factory. My college car had been modified for a bit more pep. The stock differential gears of 3.07:1 had been replaced by 4.10 gears, but the speedometer drive gear had not been replaced. Naturally, the engine speed was about 33% higher at any highway speed than with the stock gearing. The speedometer reading was likewise also off by 33%, so the speedo read 80 mph at a real 60 mph. Driving across the absolute flat, straight freeways of Nebraska one has a tendency to push the speed limit. At 75 mph, the engine was spinning the equivalent of 100 mph. Mile after mile, in the 100 degree heat, the engine buzzed along, until it banged and shook, instead of buzzed. Ask me sometime about my glorious experience in Lincoln, Nebraska waiting for Greyhound to deliver a new crankshaft, rod and piston coming from St Louis. With a generous bribe and

sob story, the mechanic got me on the road early Friday AM. I had a new job waiting in Philadelphia on Monday, so I drove straight through arriving late Saturday PM. By Sunday night I had moved into a walk-up apartment, completed a trial run on the subway, and then reported to work at 8 AM on Monday. Probably a good thing that I was young and didn't know that this couldn't be done.

A recent collector car advertisement for a 68 Firebird with a "rare" 4.1 liter (250 ci) overhead cam (OHC) inline 6 got me reminiscing. Post WWII, many engines were still of the flat head variety, although the Chevy 6 was an overhead valve design. Pontiac was beat only by Jeep in introducing an OHC engine for mass produced automotive engines. The Pontiac OHC was considered a somewhat exotic engine, with the overhead cam driven by a cogged belt. At a long-ago gourmet dinner party, the group of men got talking about cars. One of them claimed that his former Pontiac Tempest with this OHC engine would routinely beat the Pontiac GTO. This Pontiac OHC offering started in 1966 with a 3.8 liter and was increased to 4.1 liter for 68-69. The hottest version of the 3.8 liter was rated at 215 hp in 1967, and the 4.1 liter had a top rating of 230 hp. Now, I don't remember what year Tempest the owner had, but by way of comparison it should be noted that the initial GTO was simply an option package on the Tempest, with the same body and about equal weight. However, the 64 GTO was offered with either a 325 hp or 348 hp engine. Later years had even higher horsepower. I politely responded that I thought the claim could not be true as a simple horsepower:weight calculation would show that the GTO should walk away from the OHC six cylinder. My antagonist would not give up and neither would I. Judy berated me all the way home from the dinner party, but I still think I was right. You should remember that although Pontiac was building an OHC engine in 1966, the only Corvettes ever offered with an OHC were the C4 ZR-1 in 1990-95, although the ZR-1 had a much more exotic engine including double overhead cams. Continuing the Pontiac Tempest theme: By the late 1950s, the other GM divisions were paying attention to the Chevy's Corvette sales and the sporty image that the Corvette provided to the formerly rather stodgy Chevy division. Chevrolet was very protective of their 2-seater franchise and fought off the other division's ventures into this arena. In 1962 Pontiac introduced the Tempest Monte Carlo, a shortened Tempest with only 2 seats, as a concept car. The Tempest Monte Carlo was a convertible and powered by a supercharged 3.2 liter Pontiac 4 cylinder rated at about 250 hp. The supercharger was a modified GMC Roots style 3-71, originally used on a GM diesel engine. The concept Tempest was actually 2" shorter than a 62 Vette. Most concept cars of the era were crushed, but GM executive Ed Cole took possession of this Tempest. Prior to the transfer, Cole replaced the Pontiac 4 cyl engine with a Buick 3.5 liter aluminum V8. This car now resides in a private collection. You probably recognized that Chevy appropriated the Monte Carlo name for a Chevy model later in the decade.

Quick primer on GMC commercial diesel nomenclature. Mentioned above is that Tempest supercharger was a modified GMC 3-71 blower. 3-71 simply means that the original diesel engine to use this supercharger was a 3 cylinder and each cylinder displaced 71 cubic inches. You can see that the air demand of the 3.5 liter 3-cylinder diesel would be similar to the Pontiac 3.2 liter gasoline engine. Many commercial trucks used 6-71 engines. When you see that hot rod or Corvette with the top mounted supercharger sticking far above the hood, you will often find that the supercharger is a modified GM 6-71 blower. The GM 71 series engine is a prime example of modular construction. Inline 71 series engines were available in 1, 2 3, 4, & 6 cylinders. The V type 71 engine was available in 8, 12, 16 & 24 cylinders. Other common GMC diesels are the 54 and 92 ci/cylinder families.